

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of: Jan Andersson ) Attorney Docket No. 911568635006  
Application No.: 09/381,899 )  
Filed: December 16, 1999 )  
For: METHOD AND APPARATUS )  
FOR AUTOMATIC DATA )  
ACQUISITION OF FORMS )  
Examiner: Bashore, William L. )  
Art Unit: 2176 )  
Confirmation No.: 4564 )

REMARKS

New claims 50-54 have been added to the application.

Claims 2, 4, 5, 8-10, 13-15, 18, 19, 21, 22, 25-27, 30-32 and 41-54 are pending in the application. Claims 41, 45, 49, 50, 51, 53 and 54 are independent claims.

As suggested by the Examiner, claims 4 and 15 have been amended to depend from claim 41.

Claim 49 stands rejected under section 101 due to its preamble. The preamble has been amended as suggested by the Examiner. Applicant appreciates Examiner's suggestion and thanks him for it.

Claims 2, 4, 5, 8-10, 13, 14, 19, 21, 22, 25-27, 30, 31 and 41-49 stand rejected under section 103 based upon Pizano et al., U.S. 5,293, 429 (Pizano) in view of Karnin et al., U.S. 5,434, 933 (Karnin) and further in view of Suzuki et al., U.S. 4,933,979 (Suzuki). This rejection is respectfully traversed.

In response to the rejections, applicant cites legal authority followed by Argument including an analysis of the cited references, Pizano, Karnin and Suzuki. Next, there is a discussion of the Subject Application and a discussion of statements made in the Office Action. Finally, there is a discussion of new claims 50-54.

#### Legal Authority

An obviousness rejection under section 103 must cite references which are analogous and combinable and the properly combined references must teach the claimed invention. To be analogous, the references must be within the field of the inventors endeavor or reasonably pertinent to the particular problem with which the inventor was involved. *In re Deminski*, 796 F.2d 436, 442 (Fed. Cir. 1986). To be combinable under Section 103, there must be some suggestion or incentive in the teachings of the references that they be combined. *In re Oetiker*, 977 F.2d 1443, 1447 (Fed. Cir. 1992).

The examiner bears the burden of establishing analogous art as well as establishing that the references teach or suggest that they be combined. *Smiths Industries Medical Systems, Inc. v. Vital Signs, Inc.*, 183 F.3d 1347, 1356 (Fed. Cir. 1999). A disclosure in the references that teaches away from or discourages the making of the claimed invention undermines obviousness. *In re Spinnoble*, 405 F.2d 578, 587 (C.C.P.A. 1969).

Finally there is the question of whether the cited references, even if combined, teach the claimed invention. If there are limitations in the claim which do not appear in the combined references, then a Section 103 rejection is improper. *Hewlett-Packard Co. v. Bausch and Lomb, Inc.*, 909 F.2d 1464 (Fed. Cir. 1990). In an analysis of Section 103, the prior art as a whole must have suggested to one skilled in the art doing what applicant has done. *Environmental Designs, Ltd. v. Union Oil Co.*, 713 F.2d 693 (Fed. Cir. 1983).

Also to be considered is objective evidence of non-obviousness in that the claimed invention has enjoyed significant worldwide commercial success. *W.L. Gore & Associates, Inc. v. Garlock, Inc.*, 721 F.2d 1540, 1555 (Fed. Cir. 1983).

#### Argument

There is some question as to whether Pizano and Kernin are analogous art because they relate to document classification systems and not data acquisition systems. Second, because they relate only to evaluation of lines and not lines, objects and colors, there is a question of whether they are pertinent to the particular problems with which the inventor was involved.

Regardless of the relevance of Pizano and Kernin, there is no suggestion or incentive in the disclosures of Pizano, Kernin and Suzuki that they be combined, and even if combined, they do not teach every limitation in the independent claims at issue here.

#### Pizano

The Pizano reference discloses a system for automatically classifying heterogeneous business forms. Pizano's objective is to classify documents into various types but there is no teaching (or any concern at all) regarding the capture of information content of the documents so classified. The Pizano reference simply does not deal with data content. Furthermore, Pizano teaches classification by focusing solely on lines on the document being reviewed and specifically shuns objects such as logos that commonly appears on business documents. Furthermore, there is nothing adaptive with the Pizano system. Pizano requires pre-registration of templates.

Referring to the Pizano reference, it is stated quite clearly that the invention there relates to business form recognition enabling the classification of heterogeneous business forms. (See column 1, lines 41-49.) Of greater importance is the fact that Pizano requires the pre-loading of template forms to create a form dictionary and that this is done manually. The Pizano reference

states that the methodology follows the “classical pattern recognition approach in which features are extracted from the objects of interest, then matched against those of a group of templates that characterizes the pattern classes. More specifically, business form recognition involves two steps: (1) Training - during which templates representing the form classes in the application domain are scanned, their features extracted, and the results organized in a form dictionary; and (2) Classification - during which the features of actual production forms are systematically compared to those of the dictionary templates, until a match is found, or an 'unrecognized-form' within a decision is reached.” (Emphasis added.) Column 2, lines 39-55. Pizano requires the pre-process input of templates and processing continues as long as the documents are "recognized."

“The form dictionary is the repository of the information needed to support the matching process. . . The process of training the dictionary involves gathering forms representative of their classes, scanning them, and extracting their features. This task is to be performed under the supervision of a user who will determine class names or keys.” (Emphasis added.) Pizano, column 10, lines 9-24. The training or pre-processing step is laborious, done manually, time-consuming and relatively expensive.

Feature extraction requires "the use of horizontal and vertical lines as features for identifying the form". Pizano, column 3, lines 5 and 6. The "lines" being discussed are shown in Pizano's Figure 2 where a “phone order” form is shown having a number of boxes made up of horizontal and vertical lines as well as a number of horizontal lines that follow specific headings.

“In most cases, these lines provide a pattern that uniquely identifies a form, and therefore can be used to distinguish them. . . In situations where two forms share identical line organizations, there are normally form ids or logos that differentiate them. While these objects

can be used to resolve ambiguities, the current implementation of the system uses lines exclusively." (Emphasis added) Pizano, column 3, lines 15-24. This actually teaches away from what the applicant has done because there is no teaching of the Pizano system using ids or logos. Applicant discloses that "maps" are derived from "logotype 12, a vertical line element 14 and a horizontal line element 15. Note that even the logotype contains long black lines or varying degrees of shaded colored line element 16. . ." (See specification, paragraph 0021.) "The logotype 12 is represented as the line element 16 in the line map 18." (See specification, paragraph 0023.)

The Pizano reference teaches about line intersections, thin lines, and elongated lines and the need for templates. Pizano, columns 3 and 4. "The type of form recognition proposed in the present invention presumes the existence of a dictionary containing templates representing the classes of documents to be found in the application domain." Pizano, column 4, lines 41-45.

More information about the handling of the lines are described in columns 5, 6 and 7 of Pizano under the headings "3.2 Aggregate Discrimination" where line information from the templates and similar information from an actual form are condensed and values are assigned; "3.3 Intersection Discrimination" where line patterns are compared, but not the location of the lines; "3.4 Approximation Discrimination" where the location of the line patterns are taken into consideration; and "3.5 Projection Discrimination" where "unlike the approximation method (of 3.4), which depends only on whether a line falls within the boundaries of a bucket, the projection method performs a one-to-one comparison of the lines that appear in the projected image. This comparison involves both the line length, as well as the distance between lines. . . A network representation of the line projections, in which nodes represent lines and their lengths, and arcs the distance that separates them, is used in the method; see Fig. 7. The algorithm traverses the

actual form and template network simultaneously trying to match as many nodes and arcs as possible.” Finally, in “3.6 Window Matching” a test “performs a detailed analysis of the line patterns in the actual and template forms. It takes into account all the information available from the recognized lines. . .Candidates that reach this level in the matching process are expected to have very similar line patterns.”

Pizano is so complicated that the method moves very slowly and is not economical.

Pizano also states that after scanning line by line, only thin objects are selected, namely items that have thin widths, since only these are likely to be line segments. Pizano, column 4, lines 1-12.

Logos, large text, or frames are to be eliminated from any comparison, only thin lines are to be used. Pizano, column 18, lines 20-26. Pizano only deals with straight lines and not with parts of lines or objects covering several segments as in a logo, thick lines, curved lines, or wave shaped lines. Finally, Pizano makes absolutely no mention of adaptive learning capabilities.

#### Karnin

Karnin, like Pizano, discloses a document classification system and compares only lines on forms and does not concern itself with data content. The Karnin reference also requires use of a manually created template file against which incoming forms are compared.

The Karnin reference teaches the creation of a template data base. See item 2 in FIG. 2. See also Column 8, lines 36-38 where it is stated that if the "image is still not recognized, displayed it to an operator, and they can define it as a new template." See also the bottom of FIG. 2 where a form not recognized simply ends the process. Thus, templates are required and when identification fails, manual intervention by an operator is required or the process is finished.

The invention disclosed in the Karnin reference is a two-step process for form classification where the unknown form's lines are given a value, the values are displayed horizontally and the "peaks" are identified. The locations and sizes of the peaks are stored for later comparison purposes. Karnin, column 3, lines 15-20. The term "form signature" is given to the numeric representations of the template and does not refer to an individual's handwritten name, to curved lines or to objects. Karnin, column 3, lines 25-28.

As in the Pizano reference, the generation of an identity is to have the line data projected horizontally "with an emphasis on long runs." In other words, only lines are considered. Karnin, column 3, lines 57-58. Problems of noise may break up these long lines and thereby cause somewhat erroneous readings. Karnin, column 4, lines 57-60. The information is projected horizontally and then reviewed for "peaks" to generate a graphic representation shown in Karnin's FIGS. 4A and 4B. These graphic representations are called "signatures" and values (location and size) represented by these signatures are then compared to determine identity of a document to be classified.

Like Pizano, there is no teaching of adaptive learning, no automatic expansion of an identification data base, no automatic creation of templates or other identity forms and no data content capture.

#### Suzuki

The Suzuki reference discloses an apparatus for reading data from documents to replace the manual input of such data. However, much like the Pizano and Karnin references, fixed forms must be used with known data locations. This is a variation of a pre-processed template. And, an operator must, during pre-process, instruct the system where to find the data locations and what reading conditions to expect, such as type fonts or certain handwritings.

Suzuki states that "it is necessary to register the form information for each kind of form sheet from which the data are to be read. Hence, a model form sheet is set in the image scanner 2, and the frame line of the model form sheet is recognized by the frame line recognition means. . ." Suzuki, column 9, lines 51-56.

The Suzuki reference further states that the "recognized frame line is displayed on the CRP display device 3, and the operator designates the reading area by reading area designating means 30 based on the displayed frame line. Further the operator designates the reading conditions of each reading area by the reading designating means 31." (Emphasis added.) Suzuki, column 9, lines 63-68.

The "pre-processing" in Suzuki includes operator input regarding the reading area: "When a start point at a top left of the reading area and an end point at the bottom right of the reading area are designated, it is possible to form a rectangular frame (or box) defined by two parallel horizontal lines respectively passing through the start and end points along the x-direction and two parallel vertical lines respectively passing through the start and end points along the y-direction in the x-y coordinates. A region within the frame is designated as the reading area. . . .When the displayed image of the read document includes a picture portion and characters on the CRT display device 3 as shown in FIG. 5, for example, it is possible to designate only the writing portion as the reading area by designating a start point "a" and an end point "b" to define a rectangular frame (box) F1 thereby designating a reading area A1 within the frame F1 in this case. Similarly, when a start point "c" and an end point "d" are designated to define a rectangular frame F2, it is possible to designate a reading area A2 within the frame F2." Suzuki, column 6, lines 28-49.



Suzuki does not teach automatic creation of templates or other identification elements from unclassified documents during actual processing and hence, there is no teaching of an automatic expansion of the identification data base in real time. There is no automatic learning procedure at all.

### The Subject Application

The subject application discloses a method and apparatus for data acquisition from a multitude of presented documents. The example disclosed in the specification is the processing of invoices. These must be identified, read and stored so that information content may be transferred to another software program that generates payments to the vendors who sent the invoices in the first instance. The data acquisition from the processing documents, such as, dates, goods or services descriptions and amounts owed (if the document is an invoice) is both automatic and adaptive and thus different from the teaching of the cited references, even if the cited references are combined.

There is no need for pre-processing templates of the expected documents to be registered nor is there a need to create a dictionary of data locations or reading conditions. If, during processing, a presented document has a format recognized by the system, selected data content on the document is read and stored. However, if a presented document is unrecognized when presented, a map of the document is automatically stored and the process continues. Hence, there is an automatic expansion of the identification data base in real time and the expansion occurs directly from processing data containing documents.

The cited references are not adaptive systems. There is a need to pre-register templates and/or dictionaries, or a need to use fixed, known forms whose data locations are known in advance, and in the case of Suzuki, there is need for operator intervention when a document is not recognized before any data capture can take place. Furthermore, the Pizano and Karnin

references do not concern data acquisition. Both are simply document classification systems. Data content in the pre or post classified document is not considered and therefore no teaching is disclosed.

There is no teaching, suggestion or even incentive to combine the three cited references. As mentioned, two of the cited references, Pizano and Karnin, are document classification systems that operate by long line evaluation only. Neither of them even mentions data acquisition even though they came, chronologically, after the one cited reference, Suzuki, which does relate to data capture. Suzuki issued on June 12, 1990, whereas Pizano was filed more than a year later and Karnin was filed more than three years later. Furthermore, both Suzuki and Pizano are owned by the same corporation. Furthermore, Karnin cites to Pizano but not to Suzuki. These factors are evidence of a lack of relevance between the references.

The fact that Pizano and Karnin teach the need for templates and Suzuki teaches the need for fixed, known forms is evidence that the references "teach away" from the automatic data capture of the subject application.

Viewed from a different prospective, Pizano and Karnin add nothing to the pre-processing requirements of Suzuki.

Even when all of the cited references are combined, they still do not teach each and every limitation found in the claims of the subject application.

Claim 41 includes the following limitations which are not found in a combination of Pizano, Karnin and Suzuki: "presenting a plurality of documents to said computer system, said plurality of documents having a variety of formats not pre-defined for said computer system and containing data content in locations not pre-defined for said computer system". (Emphasis added.) A combination of the three references teach the need for pre-definition in the form of

templates of expected documents and/or pre-definition of data content locations and reading conditions. Claim 41 also includes the limitation: "comparing in said computer system each map of each presented document of said plurality of presented documents with all document maps previously stored". The only presented documents to the applicant's system are unknown processing documents (and not templates) and thus the map of each presented document is compared to the maps of those unknown previously processed documents. In the case of the cited references, the processed documents are compared with preprocessed templates only. Also, the "maps" defined in the application are derived from lines, logos and colors. The identification data bases in the cited reference are derived from template lines only.

Claim 41 also includes the limitation: "either automatically storing in said computer system document maps of presented documents of said plurality of presented documents that do not coincide according to predetermined limits per agreement with any document map previously stored in said computer system, or automatically identifying presented documents of said plurality of presented documents where there is agreement between document maps of such presented documents. . .said automatically storing step of document maps of presented documents of said plurality of said presented documents that do not coincide according to predetermined limits per agreement with any document map previously stored in said computer system occurring as each document map fails to be identified according to predetermined limits for agreement." In the combination of cited references, there are no "maps" as that term is defined in the application. Also, there is no automatic storing of document maps that do not coincide with the templates. As Suzuki makes quite clear, operator intervention is necessary to create and store a new template for documents which are not recognized by the system, otherwise the processing of the unknown document ends. Third, the new templates do not

"occur" during processing. In Suzuki, the system is stopped while a new template is manually inputted. If a new instruction and a new fixed form is not inputted in the Suzuki system, the process ends as shown in Suzuki, FIG. 2.

In claim 45, there is a limitation of "a computer system having adaptive recognition capability." A combination of the cited references does not include any computer system having adaptive recognition capabilities as that term is used in the application.

Claim 45 also includes the limitation that the computer system has "structure to automatically . . . store, search and compare data from a plurality of received documents having a variety of formats not pre-defined". A combination of the cited references teach only the use of templates and fixed, known forms which are pre-defined or pre-registered in the data processing apparatus.

Claim 45 includes the limitation that the computer has structure to store, search and compare data from documents "containing data content and locations not pre-defined." The teachings of Pizano and Karnin do not concern the storing of data content from processing documents and Suzuki teaches that the data content locations must be pre-defined manually by an operator before any storage is accomplished by the apparatus.

Claim 45 also includes the limitation that the computer system receives a plurality of documents "having a variety of formats not pre-defined." Again, the combination of cited references only deals with documents which have been pre-defined by template or known, fixed form.

Claim 45 also includes the limitation that the computer system has structure "to automatically search document maps previously stored". The three cited references do not store document maps as defined in the application and not of documents being processed.

Finally, claim 45 includes the limitation that "when there is a lack of recognition, said computer system has structure to automatically store such unrecognized maps." The three cited references do not teach maps as defined nor automatically storing such maps. Rather, the teachings from the three cited references state that there must be operator intervention.

Claims 49 includes the limitation of documents having a plurality of formats, "said formats and said locations not pre-defined for said computer system." As mentioned above, all of the three cited references include the need, before processing begins, for templates or fixed, known forms and instructions to be inputted.

Claim 49 also includes the limitation of "causing said computer system either to identify each of said document maps generated or to store those generated document maps not identified." The three cited references do not teach maps as defined in the application and they will not operate in the just described fashion without operator intervention.

In view of the above mentioned limitations and the comments regarding those limitations, the Examiner is respectfully requested to reconsider the rejection of the claims and to indicate allowance.

#### Questionable Statements In Office Action

In view of the above analysis regarding the cited references, Pizano, Karnin and Suzuki, certain statements made in the Office Action mailed on June 26, 2004 are called into question.

The Office Action states that Pizano "teaches generation of a form map based on designs on the unknown form for identifying information contained thereon inasmuch as Pizano's feature extraction is equivalent to the generation of a form map." This statement is incorrect for several reasons. First, Pizano generates "form images" based on lines only and is not a "map" as defined in the application. Pizano does not generate a form map based on logotypes 12, vertical lines 14, horizontal lines 15 and colored lines 16 as stated in the application. Second, being "equivalent"

is not a legal basis for rejection under Section 103. There must be a teaching in Pizano matching applicant's disclosure of lines, logos and colors.

The Office Action states further that Pizano "teaches searching and comparing the generated form map which stored registered maps in a map storage means." This statement presupposes that Pizano's form images are maps as defined in the application and that pre-registered template images are the same as maps formed from processing data containing documents; no teaching is presented as a basis for such conclusions.

The Office Action states that "Karnin teaches the storage of image signatures, which are analogous to form maps, as new templates when the image does not match any previously stored template." First, being "analogous" is not a standard under section 103. There is a requirement that the examiner must show a teaching. Second, "image signatures" are just the locations and sizes of "peaks" derived from lines only. This is not the same as a map as defined in the application. Third, new templates are not automatic and not in real time while the process is running. Karnin teaches that processing of documents must be interrupted while a new template must be inputted by operator intervention. The statement in the Office Action assumes away the invention.

The Office Action states that "One of ordinary skill in the art would have recognized that one might want to be able to match new forms in the future. Therefore, in view of Karnin's teaching, it would have been obvious of one of ordinary skill in the art at the time of the invention to modify Pizano to store non-coinciding form maps." Again, there is an assuming away of the invention. There is no teaching in Karnin to automatically store a map of a newly presented data containing document during the processing of that document. Instead, the teaching from Karnin is that an operator enters a new line-derived template before processing

continues; there is nothing done automatically by the data processing apparatus to handle an unknown document. There is no teaching that a form map is automatically formed and that this form map is automatically stored when there is no recognition. This is the automatic self-learning feature disclosed by applicant. The prior art does not teach automatic adaptation at all. There is nothing "equivalent" or "analogous" in the cited references to what applicant has disclosed in the subject application.

The Office Action states that "Pizano does not specifically teach text and colors." The Pizano reference teaches nothing about text or colors, "specifically" or generally, because it relates only to the comparisons of lines of a new document with a template and once agreement occurs the Pizano process is at an end. Pizano is not relevant for data capture nor for automatic adaptation.

The Office Action states that "Suzuki teaches both the recognition of characters and the recognition of different gradations of tones". Suzuki requires fixed, known forms and pre-registration of the reading conditions. Reading fonts and gray tones do not teach those skilled in the art to read logotypes and colors unless a reference teaching that those items are the same is cited.

The Office Action goes on to state that "one of ordinary skill in the art would have recognized that these features provided the benefit of recognizing more and more complex forms. Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the combination of Pizano and Karnin to include text and colors as objects." One skilled in the art "might" have wanted everything to be done automatically, but there is no teaching in the Pizano, Karnin and Suzuki combination to do what applicant has done.

Pizano and Karnin merely compare lines to templates so that documents are classified. Text is not relevant and logos and color are never mentioned. Suzuki teaches the use of fixed, known forms and pre-process instructions regarding locations and expected fonts. There is no teaching of automatically created maps (derived from lines, logos and color) of data containing documents during processing and, when those maps are not identified by comparing to other maps of data containing document stored earlier during the processing, automatically storing the new map to expand the identification data base being used for processing.

#### New Claims

New claims 50-54 are believed to be patentable because they all include limitations not found in a combination of the cited references. For example, claim 50 includes the limitation that documents processed have identities that are "unknown". Suzuki is the only reference to process data on documents and these documents have fixed forms; and data containing locations on the forms are known. Both Pizano and Karnin process documents whose identities are known by way of templates inputted before processing. In all of the references, unknown documents presented to the data processing apparatus will end the process unless and until an operator intervenes.

Claim 50 also includes the limitation of "automatically searching stored identities derived from previously processed documents made during processing". None of the cited references teaches this limitation.

Furthermore, claim 50 includes the limitation of "either automatically making identification. . .or automatically storing an identification of such processing document." Once again, none of the cited references teaches this limitation.

Claim 51 recites the limitations of "providing. . .a plurality of data containing documents of unknown identity. . .in the absence of any inputted templates" and "automatically reading. . .in



the absence of preprocessing inputted data location information". None of the cited references teaches such limitations.

Claim 52 recites that the automatically identifying step comprises comparing each of the processed documents "with previously processed documents and either identifying such document or automatically storing an identification of such processing document in the absence of operator intervention during processing". Once again, a combination of the cited references do not teach such limitations.

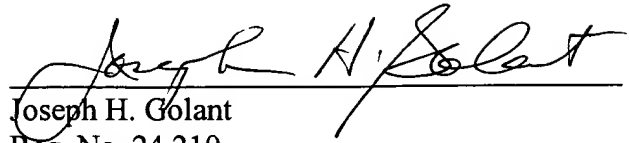
Claim 53 recites the limitation of providing unknown documents for processing "in the absence of any inputted templates. . .and in the absence of fixed forms". The combination of the cited references require templates or fixed forms.

Claim 54 recites that the "data storage structure including identification data derived from processed data containing documents wherein the identity. . .is automatically compared to the identities of the previously processed data containing documents. . .or if no match is found, the identity of the presently processing document is automatically added to the data storage structure." The combined cited references do not teach automatically adding identities of presently processed documents to the data storage structure.

Applicant respectfully requests that the rejected claims be passed to issue, and that the new claims be reviewed and also passed to issue because they include the same limitations not taught by any of the cited references alone or in any combination.

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Respectfully submitted,

A handwritten signature in black ink, reading "Joseph H. Golant", is written over a horizontal line.

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